

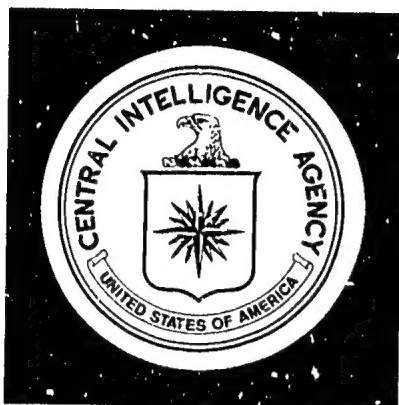
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DIRECTORATE OF
INTELLIGENCE

Intelligence Memorandum

China: Development of Network Television

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ER IM 72-132
September 1972

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CONFIDENTIAL**CONTENTS**

	<u>Page</u>
Summary	1
Introduction	3
Discussion	3
Policy	3
Stages of Development	4
The Television Network	5
The Broadband Telecommunications System	5
Programming	8
Reception	8
Color Television	10
Availability of Television and Telecommunications Equipment	11

Appendixes

A. China: Television Stations as of Mid-1972	13
B. Progress in Telecommunications in the PRC	15
C. A Comparison of Color Television Systems	17
D. China: Identified Major Television Equipment Plants as of Mid-1972	19

Table

China: Estimated Output of Television Receivers	11
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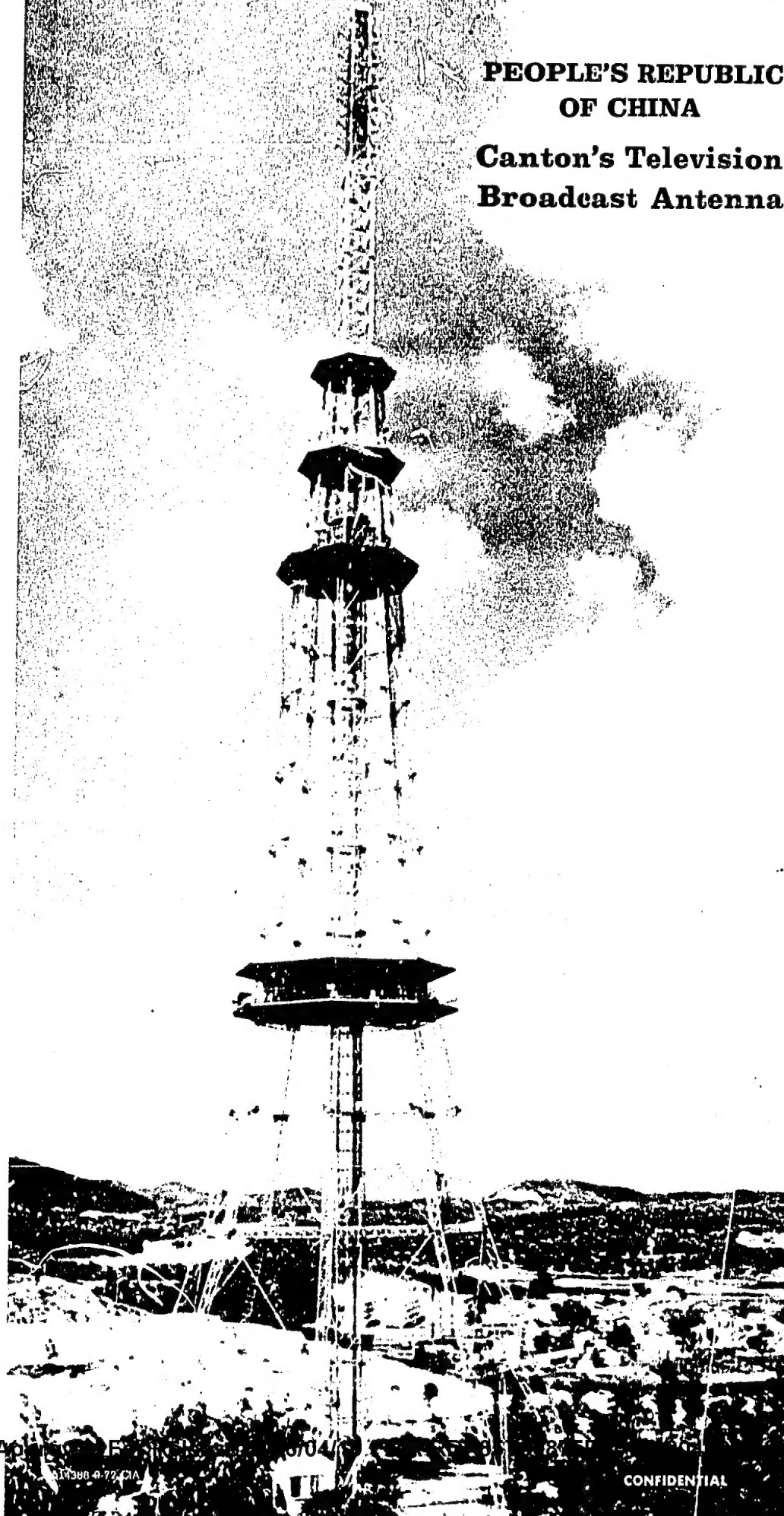
Illustrations

Canton's Television Broadcast Antenna	frontispiece
Figure 1. Probable Configuration of the Television Network, Mid-1972	2
Figure 2. Television Broadcast and Rebroadcast Facilities in Szechwan Province	6

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**PEOPLE'S REPUBLIC
OF CHINA**

**Canton's Television
Broadcast Antenna**



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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
September 1972

INTELLIGENCE MEMORANDUM

CHINA: DEVELOPMENT OF NETWORK TELEVISION

Summary

1. Network television in the People's Republic of China (PRC) serves as an instrument of government propaganda rather than as a medium of entertainment. The television network consists essentially of linked broadcasting stations in the provincial capitals of eastern China (see Figure 1), with prospects for extending the network to far western China by 1975.

2. The PRC has less than 300,000 black-and-white television sets, mostly 14-inch. Sets are located in public places such as trade union, militia, and youth centers, where as many as 100 people will cluster around a set. Broadcasting is limited to three or four hours in the evening for three to seven days in the week. Programs may originate in Peking or locally and are confined to newscasts, speeches, revolutionary operas, and other serious fare.

3. China's television sets and broadcasting equipment are manufactured by its own electronics industry. A small amount of advanced equipment and certain components are purchased from Japan and Western Europe. China has been testing foreign color television equipment for several years and currently is negotiating with Sony for the technology necessary for producing color receivers and broadcasting equipment.

4. Peking's continuing investment in television facilities involves the construction and expansion of a major network of broadband telecommunications channels which can be adapted to other uses. Subsequent investment in multiplexing equipment will permit the same

Note: This memorandum was prepared by the Office of Economic Research and coordinated within CIA.

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Figure 1



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microwave and coaxial cable links to carry large volumes of voice and non-voice traffic for national defense and for economic administration.

Introduction

5. This memorandum describes the development of the Chinese television network, from its rudimentary beginnings in 1958 to the present integrated network of 29 broadcasting stations in major cities. The memorandum examines (a) Peking's policy for a national television network; (b) the progress made up to mid-1972 in providing broadcasting on a national basis; (c) prospects for expanding the viewing audience, moving into color television, and linking up the capitals of far western China to the system; (d) the dependence on foreign equipment and technology; and (e) the important additional benefits derived from the construction of national broadband communications links.

Discussion

Policy

6. The key objective of the new Communist government of China in 1949 was to weld the country into a strong national unit in contrast to the weak disjointed China of the preceding "century of humiliation." The considerable effort and expense invested in television broadcasting facilities in recent years is a reflection of that supreme goal. Television is viewed as an important instrument for instructing and propagandizing the population. Moreover, the facilities under construction constitute the first stage in the construction of a modern national communications system which ultimately will be used for national defense and economic administration on a countrywide scale.

7. Peking's policy toward television is consistent with the general Maoist prescription for shaping the new Chinese man, with emphasis on didactic and collectivist techniques. Telecasts of speeches, revolutionary operas, and public events underscore the unity of China under Mao and provide guidance on the latest political and economic campaigns. Viewing is not a private or family affair as in other leading nations. Sets are located in the common rooms of factories, trade unions, military posts, communes, schools, and youth clubs. In many instances, former landlords, rightists, and other "bad elements" are not allowed to view television.

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Stages of Development

8. China conducted its first experimental television broadcast in 1957 with Soviet assistance. In 1958, as part of the euphoric Great Leap Forward, Peking announced a four-year plan to establish a national television system with broadcasting stations in more than 30 cities. This highly propagandized program proved a flop. By the end of 1962, only 12 cities had broadcasting stations, and these were characterized by frequent equipment failures, shortages of spare parts, and sporadic operations.

9. In this pioneering period, the Peking Broadcasting and Materials Plant was the sole facility producing television parts and equipment. This plant depended on the USSR for production equipment, technical assistance, and certain complex components. Its operations were crippled by the abrupt withdrawal of the Soviet technicians from China in mid-1960.

10. In the period of readjustment and recovery that followed the Leap Forward, China strengthened its domestic capability for producing television broadcasting and receiving equipment by importing machinery and technology from Japan and Western Europe. By the end of 1969, there were 15 broadcasting stations in China, but only four - Peking, Shanghai, Tientsin, and Canton - were equipped with studios for live programming. Programs produced in Peking were broadcast by other stations from movie film because there were no telecommunications links between stations save for an experimental link between Peking and Tientsin. The major accomplishments of the post-Leap period were the building up of China's domestic competence in the domestic production of television equipment and the gradual technical improvement of broadcasting stations already in being.

11. The Cultural Revolution (1966-69) was a period of political rectification that caused a sharp but short-lived cut in industrial production. The adverse effect on the production of communications equipment was temporary, and the technological improvement and expansion of the capacity of the electronics industry continued. It was the program content of the television industry that suffered most severely from the Cultural Revolution. Television stations were shut down for long periods, and broadcasting was largely confined to special programs on national holidays. A substantial amount of non-political educational programming, which had developed prior to the Cultural Revolution, was dropped and has not been revived as of mid-1972.

12. In 1970-72, economic planning and administration having been restored to a more orderly pace, the PRC has pushed ahead strongly with its plans for a national television network. At least 14 stations have been

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commissioned since 1969, and, as shown in Figure 1, most provincial capitals as well as several other major cities now have broadcasting stations.

The Television Network

13. The Chinese television network will ultimately provide for the transmission of programs from any one broadcasting station to all the others. It will be used primarily to carry live programs from Peking. At the present time, only stations in Peking, Shanghai, and Canton are known to be capable of transmitting programs to other stations through telecommunications channels, although most of the others are now capable of receiving broadcasts by this means. The stations at Hu-ho-hao-t'e, Nan-ning, and Lan-chou are not yet known to be connected to the new national broadband communications network. Because of their remote locations, the stations at Urumchi and Lhasa are not likely to be able to be connected to the network for some years. The construction of broadband telecommunications links (probably microwave) to Peking from these two cities can be expected eventually because of strategic and economic requirements. Meanwhile, Peking's programs on tape or film will have to be flown to these remote capitals.

14. In order to reach the wide audience desired by the leadership, television reception must be extended beyond the transmitter range of the main provincial stations. Thus about a dozen rebroadcasting stations have already been built to retransmit television signals into the outlying areas. For example, broadcasts of the provincial station at Nan-ch'ang are received and rebroadcast by relay transmitters at Chiu-chiang and Ching-te-chen, which are from 70 miles to 100 miles from Nan-ch'ang and from each other. (For the configuration of broadcast and rebroadcast facilities in Szechwan Province, see Figure 2.)

The Broadband Telecommunications System

15. The broadband telecommunications routes shown in Figure 1 represent the links that are most likely being used to connect Peking with the provincial capitals and major municipalities. The broadcasting stations shown connected into the net have been mentioned in the Chinese press as recipients of live broadcasts from Peking.

16. The press has mentioned the use of both coaxial cable and microwave radio relay to carry television broadcasts from Peking to outlying provinces. Most links probably are microwave radio relay. Microwave antenna towers, each containing a repeater station, can be placed up to 30 miles apart. Coaxial cable systems usually require repeater stations at intervals of no more than six miles to prevent unacceptable attenuation

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Figure 2

PEOPLE'S REPUBLIC OF CHINA
Television Broadcast and Rebroadcast
Facilities in Szechwan Province

Transmission Range

Transmission Network

Main Broadcasting Station

Rebroadcasting Station

FROM PEKING

TO KUEI-YANG

0 50 100 150 200 Miles

0 50 100 150 200 Kilometers

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of the signal. Microwave radio relay is accordingly cheaper than coaxial cable, and because signals carried by microwave need to be amplified only one-fifth as many times as with coaxial cable, they have a better chance of arriving at the terminal station without serious degradation.

17. China's first broadband telecommunications link was a microwave radio relay system which was constructed in 1965. It carried television transmissions between Peking and Tientsin. This system was apparently operated as a prototype because no further broadband communications were installed until 1969, when the present intensive construction program was undertaken. It has been the custom to inaugurate broadband telecommunication links with television transmissions on National Day (1 October). This practice started with the Peking-Sian link in 1969, followed by the Peking-Canton link in 1970, and the Peking-Shanghai link in 1971. By mid-1972 the Chinese news media were asserting that Peking telecasts could be viewed in Ch'ung-ch'ing, Ch'eng-tu, K'un-ming, Nan-ch'ang, Fu-chou, and Ch'ang-ch'un. Ha-erh-pin also is known to be receiving Peking broadcasts.

18. A particularly significant news item from China in February 1972 stated that about 330 miles of cable and large quantities of telecommunications equipment were installed in Szechwan Province in 1971, permitting rural television and telephone calls over the same cables. Peking broadcasts were said to be received in Nan-ch'ung, Mien-yang, Lo-shan, Ya-an, I-pin, and the Tah-sien and Nei-chiang Special Districts as well as in Ch'eng-tu, Ch'ung-ch'ing, and the Wen-chiang Special District. This statement implies that in addition to the provincial studios in Ch'eng-tu, a number of other broadcasting or rebroadcasting stations in the province can transmit programs that originate either in Ch'eng-tu or in Peking. Figure 2 shows a scheme of provincial television diffusion in Szechwan Province that is consistent with the Chinese claims.

19. The transmission of television from central studios to broadcasting stations throughout the country is by no means the only significant benefit conferred by a national broadband telecommunications system, although it is in itself a strong justification for building such a system. These systems are customarily used for long distance telephone and telegraph service, for facsimile transmission, and for data links between computers and users and between air defense radars and controllers. The transmission of television is usually the first use made of a broadband carrier system because it does not require the more complex terminal equipment needed for telephone and data link applications.

20. The Peking-Tientsin microwave link, which has been carrying television since 1965, has also been carrying direct-dial telephone channels

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since 1969. As noted above, the broadband coaxial cable in Szechwan Province is already carrying some telephone channels. It can be expected that, when the terminal equipment is available, all the broadband links in China will be carrying telephone traffic for both defense and the economy, and, where appropriate, will provide data links for military command and control. These broadband communications systems are properly a part of the national telecommunications system.⁽¹⁾

Programming

21. Television programs in China consist of carefully controlled propaganda. They usually open with edited "news" films - e.g., **The American Working People are Living in an Abyss of Suffering**. This may be followed by current television news exhorting people to work harder for the state - e.g., **Hainan Island Launches a New High Tide in Spring Cultivation and Production**. The typical program may finish by running a Communist propaganda movie such as the Albanian film **Rather Die than Surrender** or the filmed performance by the Peking Opera Company of **Taking Tiger Mountain by Strategy**.

22. Broadcasting time varies among stations, from three to seven days per week, and from three to four hours per day, almost always in the evening. For example, the Canton station broadcasts three hours per day seven days per week. On three of these days, the programs originate in Peking. On the other days, local material is transmitted. When the Shantung provincial television station in Tsinan began regular broadcasting on 15 September 1971, it announced that it would relay the programs of the central studios in Peking on Tuesdays, Thursdays, and Saturdays and transmit its own provincial programs on Wednesdays and Fridays.

23. Those stations operating before the Cultural Revolution produced some programs for children and some lecture courses on technical subjects at the college level. When television broadcasting was reestablished after the Cultural Revolution, non-political children's programs and educational programs were no longer transmitted.

Reception

24. China has less than 300,000 television receivers. Practically none of these receivers is owned by individuals. They are installed in public meeting places in communes, plants, military units, and schools. Typically, 100 or more persons crowd in front of a 14-inch (diagonal measure) black-and-white television set. For the foreseeable future, television will be made available only for mass viewing.

1. For a brief discussion of progress in China's telecommunications system, see Appendix B.

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25. Those organizations owning television receivers are concentrated in areas near main broadcasting stations. People who live near large urban communities thus have much better opportunities to view broadcasts than the majority who live in remote rural areas. For example, the Chinese-Korean Friendship Commune, about half an hour's drive from Peking, is said to have nearly 90 television sets for its 65,000 inhabitants. This showcase commune has one set for each 130 families. On the other hand the majority of communes have no receivers because they are beyond the reach of the present transmitters. As the program for constructing rebroadcast stations progresses, the potential viewing audience will vastly increase, and substantial increases in receiver production will be necessary to satisfy it.

26. Increasing the production of the usual Chinese receiver, having a 14-inch picture tube, will make television available at more mass reception points. Even so, the ratio of viewers to receivers is not likely to improve appreciably for several years. Some alleviation of the large-audience-small-picture problem can be had by producing receivers with larger picture tubes. The largest picture tubes in production in the world today are 25 inches in diagonal measurement. China's largest is 19 inches, but few of these are produced.

27. An alternative is the television projector which can project an enlargement of the picture tube image onto a screen. Such projectors are ideally suited to Chinese viewing conditions. As an adjunct to movie projectors, television projectors could bring Peking's propaganda to large segments of the population in "real" time. Although China has shown considerable interest in Western technology for the manufacture of projection television, mass production and distribution of such equipment is not likely in China during the next few years. Even small projectors cost on the order of 20 times as much as ordinary 14-inch black-and-white television receivers.

28. A third alternative presently is employed. Programs that the regime wishes to emphasize are repeated several times in a short time span. For example, in Canton, the people, both in the city neighborhoods and in rural communes, were organized by Party cadres to watch the program showing President Nixon meeting Mao Tse-tung. The program was aired on the national television network approximately ten times in March 1972. The viewing audience was screened by the cadres to keep out former landlords, former rich peasants, counterrevolutionaries, criminals, rightists, and their families, an indication that television viewing is sometimes treated as a privilege conferred by the state.

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Color Television

29. China plans to introduce color broadcasts by the end of the Fourth Five-Year Plan (1971-75). Peking is still in the preliminary stage of choosing among systems for processing color signals. The choice is not easy. Each of the three systems now in use throughout the world -- NTSC, PAL, and SECAM -- has its adherents. Each has unique advantages and disadvantages.⁽²⁾

25X1 30. China's interest in all three systems has been evident in inquiries for foreign technological information and in imports of sample lots of color television equipment. Since 1968, China has purchased studio equipment, transmitters, receivers, and test instruments from Western Europe and Japan for study. China does not have a color broadcasting capability at this time, although [] there is enough color equipment in the Peking central broadcasting station to set up a color studio. This equipment apparently is used only for experimentation and familiarization.

31. Peking's demonstrated interest in the technology of Sony Corporation of Japan indicates that China may adopt the PAL system. Sony is a world leader in the development and production of color television receivers and studio equipment. Sony engineers have developed unique circuits for receiving PAL color signals and are able to produce PAL receivers that, according to Sony, do not violate the patent rights of AEG-Telefunken of West Germany, proprietor of the PAL system.

32. The goal of introducing color television before the end of the current five-year plan can be met by broadcasting color programs in the Peking area and making all national hookup broadcasts in color. Even without color studios elsewhere in China, the claim of national broadcasts in color will have been technically sustained. Monochrome receivers will show the picture in black-and-white; the few color receivers in the Peking area that may be available by 1975 will show the picture in color. For prestige purposes, China may wish to originate color programs of important events for international transmission via the new telecommunications satellite ground station at Shanghai and the station planned for Peking. The PAL color signal is easily carried by broadband microwave channels of ordinary quality.

33. The PRC will not produce a significant number of color receivers in the next three or four years. Color sets cost 2.5 to 3 times more than black-and-white sets. In any case, the production base has not been established for either color picture tubes or the solid state components used

2. For a comparison of the three major systems of color television, see Appendix C.

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in modern receivers. When color broadcasting starts in China, it will probably be received primarily on imported sets.

Availability of Television and Telecommunications Equipment

34. The PRC produces its own monochrome television transmitters and receivers. It relies on Western suppliers for large amounts of studio equipment such as cameras, microphones, lighting equipment, and video tape recorders. The Japanese have been the principal suppliers, but substantial amounts of British, French, and Dutch equipment also have been purchased.

35. As shown in Appendix D, 12 plants have been identified as major producers of television equipment. Six of these are believed to assemble receivers. Only two plants are known to produce picture tubes. Capacity for the production of picture tubes is estimated at about 115,000 per year. Receiver production will be about 90,000 in 1972 and is not likely to exceed 100,000 by the end of 1973. Estimated annual production of television receivers in China in 1959-72 is shown in the table. In 1971-72, China has been negotiating with both UK and Japanese firms for a complete plant to produce black-and-white picture tubes. Initial plant capacity is specified as 300,000 tubes per year, divided equally between 17-inch tubes and 22-inch tubes. With this plant, production of black-and-white receivers probably will be increased to about 250,000 per year by 1975.

China: Estimated Output of Television Receivers

<u>Year</u>	<u>Output (Thousand Units)</u>	<u>Year</u>	<u>Output (Thousand Units)</u>
1959	1.0	1966	20.0
1960	2.5	1967	Declined
1961	5.0	1968	Declined
1962	10.0	1969	40.0
1963	Declined	1970	60.0
1964	12.0	1971	75.0
1965	16.0	1972	90.0

36. As for color receivers, China has shown the greatest interest in Sony receivers. These employ a simplified picture tube with a single electron gun and are made with solid state circuits arranged for either the NTSC

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or the PAL system of color broadcasting. Design studies of Japanese solid state color receivers and the trial manufacture of similar sets are being conducted at several Chinese universities and electronics plants. Small-scale production of color television receivers, using imported picture tubes, will probably be established by 1975.

37. China is nearly self-sufficient in the supply of transmitter equipment. Imports seem confined largely to power tubes. The inauguration of at least 14 broadcasting stations and a number of rebroadcasting stations in the last three years points to a domestic production capability for transmitters that has outstripped the complementary production capability for television receivers.

38. The transmission of Peking-originated television programs to the major urban areas of China, achieved during the last two years, demonstrates a significant domestic capability to produce and install broadband telecommunication systems of both coaxial cable and microwave radio relay type. The equipment for the microwave radio relay systems is probably derived from the Soviet Vesna-240 microwave system which was imported for study in 1959.⁽³⁾ The installation program for broadband communications has been accompanied during the last two years by large-scale imports from Japan of measuring and testing instruments for coaxial cable and microwave radio relay systems. Moreover, probably in order to augment domestic production and speed up the completion of the national broadband system, China recently ordered from the United Kingdom the equipment for a 300 mile long microwave radio relay line. The completed national television network will be tied into the international net via Intelsat earth stations at Peking and Shanghai, supplied by RCA Global Communications Inc.

3. The Vesna-240 is a 4 GHz (gigahertz) microwave system with two radio frequency trunks, each having a maximum capacity of 240 telephone channels or one television channel. A subsequent design of the Vesna, the R600, is now widely deployed throughout the USSR and provides a maximum capability of 600 telephone channels or one television channel in each of five operational trunks.

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APPENDIX A

China: Television Stations as of Mid-1972

<u>Location</u>	<u>Province</u>	<u>Date Com-missioned</u>	<u>Type of Facility^a</u>
Canton	Kwangtung	1958	Main
Peking	Peking		
	Municipality	1958	Central
Tai-yuan	Shansi	1958	Main
Ha-erh-pin	Heilungkiang	1959	Main
Shanghai	Shanghai		
	Municipality	1959	Main
Ch'ang-ch'un	Kirin	1960	Main
Hangchow	Chekiang	1960	Main
Nan-ch'ing	Kiangsu	1960	Main
Shen-yang	Liaoning	1960	Main
Tientsin	Tientsin		
	Municipality	1960	Main
Wu-han	Hupei	1960	Main
Fu-chow	Fukien	1961	Main
Sian	Shensi	1965	Main
K'un-ming	Yunnan	1969	Main
Tsinan	Shantung	1969	Main
Cheng chow	Honan	1970	Main
Ch'eng-tu	Szechwan	1970	Main
Ch'ung-ch'ing	Szechwan	1970	Main
Hofei	Anhui	1970	Main
Hu-nei hzo-t'e	Inner Mongolian		
	Autonomous		
	Region	1970	Local
Kuei-yang	Kweichow	1970	Main
Lan-chow	Kansu	1970	Local
Lhasa	Tibet	1970	Local
Nan-ning	Kwangsi Chuang		
	Autonomous		
	Region	1970	Local
Shih-chia- chuang	Hopoh	1970	Main
Urumchi	Sinkiang Uighur		
	Autonomous		
	Region	1970	Local
Ch'ang-sha	Hunan	1971	Main
Nan-ch'ang	Kiangsi	1971	Main
Tsingtao	Shantung	1971	Main

a. Main television stations are capable of broadcasting live programs from Peking; local stations broadcast Peking programs from film or tape.

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APPENDIX B

Progress in Telecommunications in the PRC

Before the Cultural Revolution, China accorded the development of telecommunications a relatively low priority. Telephone communications in particular did not keep pace with the rapid growth of economic activity. Chinese officials have acknowledged recently that their telecommunications system is completely inadequate. It consists mostly of open wire lines and high frequency point-to-point radio. For long haul telephone traffic, multiplexing of only up to 12 channels per wire pair has been accomplished, representative of world technology in 1940. A major cause of the present inadequacy of China's communications has been the electronics industry's neglect of telephone technology in order to concentrate on the development of weapon systems and tactical communications for the military forces.

As for military communication traffic, the rapidly expanding requirements for command and control of a complex defense system in a large country are in stiff competition with economic requirements for use of the long haul circuits. China is developing an offensive missile capability which, together with the growth of air and naval forces and the proliferation of early warning radars and defensive missile sites, tends to increase demands for the dedication of civilian circuits to military use. The best general solution to China's growing communications crisis is the installation of multiplexed broadband carrier equipment, using microwave radio relay or coaxial cable. For long haul traffic between Northwestern and Eastern China, consideration may be given to a tropospheric scatter system. China is also interested in domestic satellite communications which, while initially expensive, might provide the most economical national system in the long run.

In keeping with its new image as a participant in international affairs, China installed an earth station at Shanghai in February 1972 for communicating with the Western Hemisphere and the South Pacific area via an Intelsat satellite over the Pacific Ocean. This station, which was purchased from RCA Global Communications Inc., for about \$2.5 million, is to be upgraded by the supplier from one television channel and 24 voice channels to one television channel and 60 voice channels. At the same time the 10-meter-diameter earth station antenna is to be replaced by one of 30 meters in order that the station meet with current Intelsat standards.

A second earth station will be erected by RCA Global at Peking to carry China's traffic with Africa, the Near East, and Europe. Initially, the

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Peking station will have one television channel and 60 voice channels with provision for future channel expansion. The Peking earth station, which will have a 30-meter parabolic antenna, will cost nearly \$3.5 million and take eight months to install. The upgrading of the Shanghai station will cost about \$2.1 million and be completed in about a year.

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APPENDIX C

A Comparison of Color Television Systems

The NTSC system was developed by RCA and became the US standard in 1953. NTSC is now also standard in Canada, Japan, Republic of China, Saudi Arabia, and the Philippines. In 1967, more than 10 million NTSC receivers were in use in the United States alone. PAL was developed by AEG-Telefunken of West Germany and became the standard in the United Kingdom and in all the countries of Western Europe (except France) in the period since 1965. SECAM was developed by Compagnie Francaise de Television of France and became the standard of France, the USSR, and the East European Communist countries in 1967.

In the United States and Japan alone, there are now about 60 million color sets receiving NTSC broadcasts. In the United Kingdom and Western Europe, more than a million PAL sets are in use and the number is rapidly growing. Only in France is SECAM presently in regular operation. The number of sets is small.

Two principal advantages of the PAL and SECAM systems over NTSC are ease of recording on ordinary helical-scan tape recorders and ability to be transmitted by telecommunications systems that are not carefully controlled with respect to distortion of the phase and amplitude of the signal. NTSC requires a high-quality tape recorder of the transverse scan type. Even more serious is the requirement for precise phase and amplitude control of the transmitted signal as it passes through the numerous repeater stations of the broadband communications system. These potential technological constraints on the use of the NTSC system have not been serious for the present users because of the high quality of video tape recorders and telecommunications systems built in the United States and Japan.

The receivers for the systems differ in several respects. NTSC receivers require three picture controls - brightness, tint, and color. PAL receivers require controls for only brightness and color. SECAM receivers require only brightness controls. Because more internal circuitry is necessary in the SECAM and PAL receivers, the advantage of the simplified control is offset by a higher price.

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APPENDIX D

China: Identified Major Television Equipment Plants
as of Mid-1972^a

<u>Plants</u>	<u>Products</u>
Anshan Broadcasting Equipment and Materials Plant	Model-1000, one-channel television transmitter. Industrial television equipment (1965).
Fu-shun Broadcasting Equipment and Materials Plant	Television, broadcasting equipment -- cameras, transmitters, and control equipment for television studios. Television equipment for industry, hospitals, and educational television.
Ha-ehr-pin Broadcasting Equipment and Materials Plant	Television transmitters (1970).
Liaoning Broadcasting Equipment and Materials Plant	Television receivers for industrial application, and television cameras (1965).
Nan-ch'ing Electron Tube Plant ^b	Television studio illuminating lamps and cathode ray tubes (picture tubes) for television receivers (1964).
Nan-ch'ing Radio Factory	Hsuing-mao brand television receivers -- 15-inch picture tube (1963). Production at this plant ceased in 1966. Television receiver production reportedly was restarted in Nan-ch'ing in 1969.
Peking Broadcasting Equipment and Materials Plant	Television receivers, television transmitting control panels, and television cameras (1964). Model SGB-5 industrial (closed circuit) television camera system (1969).

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Plants	Products
Peking Electron Tube Plant ^b	Cathode ray tubes (picture tubes) for television receivers (1961).
Shanghai Broadcasting Equipment and Materials Plant	Shanghai brand television receiver, model 104 series.
Shanghai Radio Factory	Television receivers and equipment (1969).
Tientsin Cable Plant	40-strand television cable (1959). This is the only identified production facility for television cable.
Tientsin Radio Plant	Television receivers; model 820 Pei-ch'ing brand receiver with a 17-inch picture tube, model 821 Tientsin brand receiver with a 14-inch picture tube, model 822 industrial television system, and model 824 Pei-ch'ing brand receiver with a 19-inch picture tube (1968).

a. Since the Cultural Revolution, trial production of television receivers has been reported at plants in Canton, Hangchow, Hefei, K'un-ming, Lan-chou, and Shanghai. However, regular production at these plants has not been verified.

b. These plants are the only identified producers of television picture tubes in China.

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